



Faculty of Economics, Thammasat University

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**THAMMASAT REVIEW OF
ECONOMIC AND SOCIAL POLICY**

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The Case of Thailand

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Thammasat Review of Economic and Social Policy (TRESP)
Faculty of Economics, Thammasat University
2 Prachan Road, Bangkok 10200, Thailand
Tel. +66 2 696 5979
Fax. +66 2 696 5987
E-mail: TRESP@econ.tu.ac.th
Url: <https://so04.tci-thaijo.org/index.php/TRESP>

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Editorial Introduction

This issue of TRESP contains a well-diversified combination of quality research findings that have important policy implications, particularly for developing and emerging countries. In the first paper, ‘Innovation and Productivity in the Service Sector: The Case of Thailand’, Peera Charoenporn and Supawat Choksawatpaisan empirically examine the impacts of R&D on innovation and productivity in the service sector. Thailand’s service sector accounts for more than 60 percent of the country’s GDP but innovation has not progressed much over decades of economic development, and little has been understood.

Utilizing data from the Research, Development, and Innovation (RDI) survey between 2011 and 2018, this study performs a three-stage Crépon-Duguet-Mairesse (CDM) econometric model across the different sectors to investigate the relationship between R&D, innovation, and productivity. The paper found the clear link between R&D activities and service innovation and productivity. It argues that firms’ resource base is vital for innovation and suggests the role of government in promoting supply-side measures. It also highlights the importance of executives’ incentive to innovate as a result of market competition. Opening market competition and liberalization in service sector should, therefore, be promoted.

The second article of this issue is ‘The CPTPP and Vietnam: Impact, Covid-19 Pandemic and Causes of Resilience’ by Tran Van Hoa, Jo Vu and Pham Quang Thao, which assesses the impact of the CPTPP on Vietnam through the Covid-19 pandemic and the country’s surprising observed resilience.

The paper analyses national accounting and UNCTAD data and argues that achievements and characteristics of the Vietnamese economy are attributable essentially to its successful development processes that include openness policy and legal and institutional reforms since the landmark Doi Moi. It also discusses useful lessons learned to enhance the agreement's major benefits or to mitigate the consequences of adverse crises.

The third article 'Fostering Active Ageing in Thailand's Informal Economy: A Policy Imperative', by Euamporn Phijaisanit, highlights Thailand's unique challenge from looming ageing societies where a large informal sector excludes most workers from mandatory retirement ages and social security coverage and discusses the underutilized potential of Thailand's extensive informal sector as a source of employment opportunities for older adults. It suggests the data-driven policy making approach using Active Ageing Index (AAI) as a policy tool, identifying the missing elements in the localities where policy should prioritize.

Thammasat Review of Economic and Social Policy (TRESP) is a young biannual double-blind peer reviewed international journal published in June and December. Its first publication was in December 2015. The Faculty of Economics, Thammasat University and the Editorial Team of TRESP seek to provide an effective platform for reflecting practical and policy-oriented perspectives that links the academic and policymaking community. Having devoted to our 'knowledge-for-all' philosophy so as to drive our society forward, the Faculty decided that TRESP shall be published in an open access model. Authors are responsible for the published articles. The views and opinions expressed in the articles do not necessarily reflect those of the Editors and the Editorial Board. For further information and updates on this journal, or

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Editor-in-Chief

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Innovation and Productivity in the Service Sector: The Case of Thailand

Peera Charoenporn

Faculty of Economics, Thammasat University
Thailand

Corresponding author: peera@econ.tu.ac.th

Supawat Choksawatpaisan

Analyst, Krugsri Research, Thailand

ABSTRACT

Various literature investigates the determining factor of research and development (R&D) and the impacts of R&D on firms' innovation performance and productivity. However, most available studies focus on manufacturing firms; little is considered about firms in the service sector. The gap is more evident in the case of service firms in developing countries. This study analyzes the data from the Thailand R&D/Innovation Survey 2011–2018 and applies a structural model that describes the link between R&D expenditure, innovation output, and productivity (the CDM model). The study found a link between R&D activities, innovation output, and productivity in the service sector. The results show that firms with higher R&D intensity tend to offer superior innovation performance. Firms' characteristics and behavioral factors, such as size, openness strategy, foreign share, and exporting behavior, increase the propensity to invest in R&D activity. In addition, innovation output has a positive impact on firm productivity. This study highlights the importance of promoting R&D activities and innovation as the basis for improved productivity of service firms in Thailand and highlights some differences in R&D activities and innovations between the service sector and the manufacturing industry.

Keywords: Service sector, Innovation, R&D, Productivity, CDM model

JEL Classification: C30, L8, D24, O31

1. Introduction

Over the past decade, Thai service businesses have continued to grow and play an increasingly important role in the country's economy. The expansion of the service sector is likely to accelerate as Thailand approaches high-income status, as previously happened in other countries. Rapid urbanization has enhanced this trend (Asian Development Bank, 2012).

Thailand's service sector is an important sector of the country's economy, with a value of 10.26 trillion baht in 2019, accounting for 61% of Thailand's gross domestic product (GDP). There are more than 663,000 companies in the service industry in Thailand. The service sector uses 40 percent of the labor force and lags behind manufacturing productivity by 30 percent. Unlike many peers, Thailand's service sector share has not grown, is dominated by lower-productivity industries employing lower-skilled workers, and boasts a low share of service exports, which tend to be in traditional sectors (World Bank Group, 2016).

The lack of productivity and innovation in the service sector causes lower incomes for workers, high costs, and low quality for companies, impeding the manufacturing sector's competitiveness (Kohphaiboon, 2018). The service sector is likely to be an intermediate input for the manufacturing sector, supporting the manufacturing sector to operate more efficiently (such as transportation and financial services). Manufacturing-related services (such as design, consulting, or factory installation and machinery) are also vital because they increase competitiveness and product value-added. Domestic manufacturers can offer such services (design, waste management, and other advanced services) if they rely on imports.

An extensive literature analyzes the determinants of research and development (R&D) and the impacts of R&D on firms' innovation performance and productivity (see Crépon, Duguet, and Mairesse, 1998; Fuentes et al., 2015). Because most available studies focus on manufacturing firms, very little is known about firms in the service sector. The gap is even more noticeable in the case of service firms in developing countries.

This study aims to understand how to make the Thai service sector more productive and innovative. This study explored the linkages between R&D activities, innovation, and productivity in the service sector. In addition, we investigated innovation activities in the service sector and the differences in R&D activities and innovation between the service and manufacturing sectors.

The hypothesis of this study consists of the following: (1) There are linkages between R&D activities, innovation, and productivity in the service sector; and (2) there are differences between the service and manufacturing sectors regarding the decision to innovate and the decision to invest in innovation and learning activities.

This study uses data from the Research, Development, and Innovation (RDI) survey between 2011 and 2018. Based on Crépon, Duguet, and Mairesse (1998), this study performs a three-stage Crépon-Duguet-Mairesse (CDM) econometric model across the different sectors. The CDM model investigates the relationship between R&D, innovation, and productivity. The conclusions from the case studies will be summarized.

The remaining parts of this study are organized as follows: Section 1 presents a brief overview of recent contributions to the literature on innovation in services. Section 2 shows service innovation and productivity in the Thai service sector and explains the data from the Thailand R&D/Innovation

Survey 2011-2018 compared with the manufacturing sector in Thailand. Section 3 introduces the CDM model. Section 4 presents the results from our three-stage CDM econometric model. Finally, Section 5 concludes.

2. Literature Review

There are few studies of innovation in services (Drejer, 2004; Evangelista, 2000; Hauknes, 1996; Miles et al., 1995; Fuentes et al., 2015). One reason for the scarcity is that theoretical developments have been based primarily on the study of technological innovation in manufacturing activities (Gallouj and Weinstein, 1997; Evangelista, 2000; Drejer, 2004). The immaterial nature of services also hinders the possibilities of measuring through traditional methods R&D and productivity. Moreover, tracking improvements or changes in products or services (quality level) (Gallouj and Weinstein, 1997), Many R&D and innovation surveys were conducted in developing countries following the Oslo Manual (1992, 1997, 2005, 2018). Therefore, the study of innovation in services builds on the technology-based approach, also known as the assimilation approach, and definitions used to research the manufacturing sector (technological and product innovation) (see Drejer, 2004; Tether and Howells, 2007).

Djellal and Gallouj (2000) and Tether and Miles (2000) criticize the assimilation approach, arguing that it ignores that innovation in services has specific characteristics. They suggest that, in addition to technological innovations, the definition of innovation should encompass various non-technological innovations, including organizational innovations. They stress the interactions and complementarities between these two types of innovations (Tether and Howells, 2007). Moreover, the focus of research has shifted from technology to knowledge, away from the

study of individual firms, to understand value chains or networks, locating services, and manufacturing as interconnected parts in a system. This study, therefore,

2.1 The three-stage Crépon-Duguet-Mairesse (CDM) econometric model

The three-stage Crépon-Duguet-Mairesse (CDM) econometric model is used to study the main determinants of technological innovation and the impacts on the productivity of service firms. For the comprehensiveness of the analysis, we benchmarked the results of service firms with those of manufacturing firms. The question is how applicable the methodology is to studying the determinants of innovation and the impacts on productivity in service firms.

A challenge of using the CDM model in service firms is that the model tends to rely on R&D expenditures as a proxy to identify innovative firms. However, R&D may not be the preferred learning mechanism underpinning innovations (OECD, 2009). Service firms may find it challenging to track and record R&D expenditures or even consider the funds used for innovation the same way as they are understood in the manufacturing context.

R&D and innovation in the service sector are related to developing a new service concept or a significant development of a service process, which will create more value for the company and partners (through co-creation). Service innovation is a new service or solution through a unique interaction with customers, valuing new systems or business partners, increasing revenue in a new way, and an organization or service system for new technology (Den Hertog, 2010, p. 19).

Service innovation means a product, service, or process resulting from technology or systematic processes and providing better service. Service innovation is carried out in the private and government sectors. Service innovation

contains technological activities for which it is not necessary to rely on R&D. These companies have the potential to change their actions in many ways, especially their relationships with customers, shipping methods, and the development of new products and services. These service innovations require new technology and the capabilities of service organizations (Miles, 2013).

3. Innovation and Productivity in the Thai Service Sector

Thailand's service sector is an important sector of the country's economy. However, most service firms in Thailand offer traditional services, which require labor, leading to limitations in upgrading innovation. In Thailand, the demand for services has also expanded, reflecting the increase in the country's living standards. The growing number of foreign tourists has also created a strong demand for these services. Firms in developed economies tend to purchase business services as intermediate inputs, such as financial services and information services, to satisfy their customers' needs and improve their products. Along with its economic development, more sophisticated business services sectors have been growing fast. However, compared to its substantial tourism sector, the sector of high-end business services in Thailand remains small (Suzuki et al., 2020).

Despite its increasing presence, the services sector's productivity shows a mixed picture. The productivity level of some service sectors, which embrace a high share of employment, such as the hospitality and restaurant industries, is lower than that of others. In contrast, high-productivity business services employ a smaller percentage of workers. Labor productivity in the Thai service sector increases slightly compared to neighboring countries in ASEAN (World Bank Group, 2016). Thailand's service sector has lower productivity

than production in the manufacturing industry (Suzuki et al., 2020; Sawatpanich et al., 2018).

The reason might be a low standard in the service sector, limiting the growth of productivity. Another reason is the lack of investment, especially foreign direct investment (FDI), in the in-service industry, resulting in a lack of opportunities to upgrade technology. Lifting the productivity level of the traditional service sectors while stimulating growth in the modern service sectors is essential to improving overall productivity. This fact calls for a new policy focus to foster modern service sectors that can drive higher productivity growth in the long run in Thailand (Suzuki et al., 2020).

Thailand has more stringent market rules than ASEAN countries. The Thai government protects some service firms from market competition from foreign and domestic firms, especially professional services and other services operated by state enterprises. Low competition may not encourage the Thai service sector to carry out innovative activities. Therefore, the liberalization of the service sector and professional work opportunities are the key factors in increasing efficiency, quality, and new ideas for the service sector in Thailand (World Bank Group, 2016).

Foreign affiliates can act as suppliers of more sophisticated services to Thai manufacturing and consumers, expanding the service sectors in Thailand and thus also benefiting Thailand's domestic economy. Estimates suggest that the services provided in Thailand are significant contributors to the productivity of manufacturing.

3.1 Innovative Service Firms in Thailand

The study compared innovative and non-innovative service firms using the Chi-square test and the ANOVA F-test and using data from Thailand's RDI surveys in 2011, 2014, 2016, 2017, and 2018 (see Table 1). The results show that the

innovative service firms tend to be younger, being multinational firms with a higher percentage of exports.

Innovation activities in the service sector are aimed at developing new services. They use more external funding than in the handicraft industry. They spend more money on developing people but less on purchasing machines. Most innovations in the service sector are product innovations. The essential cooperation of innovative service firms is between local suppliers, parent companies, and foreign suppliers, while professional associations are the least important.

The innovative service firms have more employees, more technological activities, more organizational innovation and market innovation, more patents, more cooperation with public research institutes and universities, and received more innovative support measures from various public organizations such as the Office of the Board of Investment (BOI), the National Science and Technology Development Agency (NSTDA), the Office of the National Higher Education Science Research and Innovation Policy Council (NXPO), and the National Innovation Agency (NIA) than the non-innovative service firms. However, there were no statistical differences in financial variables (assets, capital, revenue, and profit), internal R&D, or technological innovation.

Compared to the innovative service firms and the innovative manufacturing firms, this study found that the most innovative service firms are Thai firms with a smaller share of export revenue and a larger share of service and trading revenue.

Compared to innovative manufacturing firms, this study found that innovative service firms have fewer employees, fewer technological activities, fewer internal R&D activities, more process innovation, more patents, and less cooperation with universities and public research institutes. They receive

less support regarding innovation and productivity from the government.

Innovative service firms received less support from the BOI and NSTDA. However, the study did not find any differences between the innovative service firms and the innovative manufacturing firms in firm age, financial profile (based on assets, capital, revenue, and profit), or support measures from NXPO and NIA.

Table 1: The estimation of factors influencing innovation spending between innovative and non-innovative service firms and innovative manufacturing firms

Items	Service Firms			Innovative Firms		
	Innovative	Non-Innovative	Pr.	Services	Manufacturing	Pr.
Firm age	21.66 years	22.25 years	0.78	21.66 years	21.43 years	0.15
MNE ownership	10.48%	9.19%	0.10 *	10.48%	19.36%	0.00 ***
Asset	2.2 billion Baht	1.8 billion Baht	0.49	2.2 billion Baht	2.4 billion Baht	0.81
Capital	0.5 billion Baht	0.3 billion Baht	0.02 **	0.5 billion Baht	2 billion Baht	0.41
Revenue	1.4 billion Baht	1.1 billion Baht	0.30	1.4 billion Baht	3 billion Baht	0.18
Profit	0.14 billion Baht	0.09 billion Baht	0.03 **	0.14 billion Baht	0.18 billion Baht	0.39
Export revenue	9.19%	7.02%	0.00 ***	9.19%	29.32%	0.00 ***
Revenue from parent company	6.67%	4.38%	0.00 ***	6.67%	18.14%	0.00 ***
Revenue from OEM	6.31%	4.72%	0.00 ***	6.31%	22.02%	0.00 ***
Revenue from ODM	3.61%	3.57%	0.94	3.61%	12.90%	0.00 ***
Revenue from OBM	14.58%	7.85%	0.00 ***	14.58%	37.50%	0.00 ***
Revenue from Service	45.91%	58.82%	0.00 ***	45.91%	3.14%	0.00 ***
Revenue from "Bought-and-Sold" trading	12.75%	11.06%	0.03 **	12.75%	4.55%	0.00 ***
Size	355 persons	254 persons	0.00 ***	355 persons	479 persons	0.00 ***
Technological activities	82.55%	69.24%	0.00 ***	82.55%	93.80%	0.00 ***

Items	Service Firms			Innovative Firms			
	Innovative	Non-Innovative	Pr.	Services	Manufacturing	Pr.	
Internal R&D expenditure	2.6 million Baht	2.4 million Baht	0.95	2.6 million Baht	6.0 million Baht	0.01	***
Product Innovation	72.83%	0.00%	0.00 ***	72.83%	79.89%	0.00	***
Process Innovation	54.29%	0.00%	0.00 ***	54.29%	41.91%	0.00	***
Organizational Innovation	72.03%	53.38%	0.00 ***	72.03%	69.57%	0.05	*
Marketing Innovation	71.93%	43.92%	0.00 ***	71.93%	69.27%	0.05	*
The importance for the cooperation with "local suppliers"	25.11%	12.74%	0.00 ***	25.11%	34.30%	0.00	***
The importance for the cooperation with "foreign suppliers"	13.22%	7.46%	0.00 ***	13.22%	22.97%	0.00	***
The importance for the cooperation with "parent company"	15.33%	8.27%	0.00 ***	15.33%	19.83%	0.00	***
The importance for the cooperation with "private non-profit"	6.86%	3.48%	0.00 ***	6.86%	7.92%	0.15	
The importance for the cooperation with "competitors"	12.07%	4.22%	0.00 ***	12.07%	9.83%	0.01	***
The importance for the cooperation with "professional associations"	5.61%	3.01%	0.00 ***	5.61%	8.14%	0.00	***
Patent	16.70%	7.14%	0.00 ***	16.70%	21.65%	0.00	***
Collaboration with university	13.67%	5.77%	0.00 ***	13.67%	18.27%	0.00	***

Items	Service Firms				Innovative Firms			
	Innovative	Non-Innovative	Pr.		Services	Manufacturing	Pr.	
Collaboration with PRI	20.77%	9.27%	0.00	***	20.77%	25.45%	0.00	***
BOI support	10.81%	7.02%	0.00	***	10.81%	18.83%	0.00	***
NSTDA support	9.38%	2.66%	0.00	***	9.38%	16.77%	0.00	***
NXPO support	1.77%	0.16%	0.00	***	1.77%	1.32%	0.16	
NIA support	3.49%	0.76%	0.00	***	3.49%	3.77%	0.59	

Source: Author's analysis based on RDI survey 2011, 2014, 2016, 2017, and 2018

Note: *** denotes a statistically significant at a 1 percent level, ** denotes a statistically significant at a 5 percent level, * denotes a statistically significant at a 10 percent level

4. Methodology

This study refines an original version of a CDM model introduced by Crepon et al. (1998) to analyze the linkages between R&D, innovation, and productivity. First, firms will decide on the allocation of resources to activities related to R&D. Then they will choose whether to conduct R&D or not and how much money to spend on it. Investing in that will lead to knowledge production, link to product or process innovation, and enhance productivity. The refined version of the CDM model consists of three equations, including R&D, (technological) innovation, and productivity.

4.1 R&D Equations

There are two equations in this step, including R&D decision and R&D intensity equations. Firms will decide whether they should invest in R&D activities or not, and then the proportion of R&D spending. The Heckman 2-step model is applied to alleviate the selectivity bias problem in the R&D intensity equation. First, the effects of explanatory variables on R&D decisions will be estimated using the maximum likelihood method, like the probit model. The average partial effect (APE) will calculate the coefficient. The R&D decision equation can be illustrated as follows:

$$R\&DDecision = \beta_1 X_1 + \varepsilon_1 \quad (1)$$

Where R&D Decision denotes the R&D decision of a firm. X_1 denotes a set of explanatory variables consisting of labor, foreign direct investment, export, patent, and firm age. β_1 denotes a set of variable coefficients. ε_1 represents an error term.

Second, the impacts of factors influencing R&D intensity are estimated by ordinary least squares regression (OLS). The

inverse Mills ratio term predicted from the first equation is included to deal with the selection bias. It can be shown as follows:

$$\log(R\&DIntensity) = \beta_2 X_2 + \beta_\lambda \lambda + \varepsilon_2 \quad (2)$$

Where R&D intensity denotes a proportion of R&D spending to revenue. X_2 denotes the same set of explanatory variables as the first equation. λ denotes an inverse Mills ratio predicted from the first equation. β denotes a set of variable coefficients. ε_2 denotes an error term.

4.2 Innovation Equation

In this step, the impacts of factors influencing technological innovation, a dummy variable, are analyzed using probit regression. The coefficients are estimated by calculating the average partial effect (APE).

$$Innovation = \beta_{R\&D}(R\&DIntensity) + \beta_3 X_3 + \varepsilon_3 \quad (3)$$

Innovation denotes technological innovation (product or process innovation). R&D intensity indicates the proportion of R&D spending to revenue. X_3 denotes a set of explanatory variables consisting of labor, FDI, export, the importance of cooperation with other organizations (locally-owned suppliers, foreign-owned suppliers, parent company, private non-profit, competitors, and professional and industry associations), acquisition of machinery, equipment, and software, acquisition of other external knowledge, innovation training, market introduction, product design, government support (BOI, NIA, NXPO), cooperation with universities, collaboration with a public research institute, and KIBS. β

denotes a set of variable coefficients. ε_3 represents an error term.

4.3 Productivity Equation

The effects of technological innovation and other factors on labor productivity can be estimated by two-stage least squares (2SLS) regression. The 2SLS model reduces the simultaneity bias from the correlations between innovation and other unobserved factors. The instrumental variables of innovation in the first-stage equation are R&D decisions, FDI, exports, the importance of cooperation with the parent company and business service provider, and the acquisition of machinery, equipment, and software. Technological innovation and other control variables can be written in the following equation:

$$\log\left(\frac{Revenue}{Labor}\right) = \beta_I(Innovation) + \beta_L \log(Labor) + \beta_C \log(Capital) + \beta_4 X_4 + \varepsilon_4 \quad (4)$$

Where revenue/labor denotes labor productivity (the proportion of revenue to labor). Innovation denotes technological innovation (product or process innovation). Labor denotes the number of laborers. Capital denotes the amount of capital. X_4 denotes the set of control variables, including non-technological innovation (organizational and marketing innovation), firm age, FDI, and export. β denotes a set of variable coefficients. ε_3 denotes an error term.

4.4 Descriptive Statistics

The descriptive statistics shown in the appendix summarize a data set from the RDI survey. It covers 31,208 firms, including 21,782 manufacturing firms and 9,426 service firms (including 712 KIBS firms). KIBS consists of a

computer consulting sector (ISIC 62), architecture and engineering activities, a testing and technical analysis sector (ISIC 71), and scientific research and development (ISIC 72) (Mercedes Rodriguez & José Antonio Camacho, 2010). The survey is cleaned up by dropping some companies that reported unrealistic information such as negative revenue, a high proportion of R&D intensity (more than 50% of revenue), and high profit (more than twice revenue).

5. Results and Discussion

The results from the CDM model consist of R&D decision and intensity, innovation, and productivity equations, which can be explained as follows:

5.1 R&D Decision Equation

The estimation of factors influencing a firm's decision to carry out R&D activities using 2-step Heckman regression is illustrated in Table 2. The model passes the specification test and correctly classified about 77.85%, 70.72%, and 85.12% of the samples in all industrial and service sectors, respectively. For all samples, our results show that R&D decisions are positively correlated with labor (firm size), export (international competition stimulates R&D activities), and patent (intellectual protection leads to the chance to make a profit from innovation). Patent protection does not affect the decision to engage in innovation and R&D activities in the manufacturing sector. However, it can play an important role in the R&D decisions of service firms.

Foreign investment reduces R&D decisions because foreign firms import technology from their country, and firm age has a significant effect on R&D decisions because firms can apply internal knowledge.

The comparison between manufacturing and service firms' R&D decisions shows that export is more critical for service than for the manufacturing sector in R&D decisions. The result aligns with Sujarittanonta, P., and Kamseang, C. (2017), who state that market competition contributes to innovation. The influence of patents on R&D decisions is more essential for service firms than for manufacturing firms. The number of staff has a more positive and significant effect on manufacturing than the service sector. The result is a significant negative effect of foreign investment on manufacturing firms' R&D decisions but is insignificant in the service sector. The service sector is more likely to serve domestic customer needs. In addition, more KIBS than traditional services choose R&D activities.

Table 2: The estimation of factors influencing a firm's R&D decision

Dependent variable: R&D decision (dummy)	All sectors			Manufacturing sector			Service sector		
	Coef.		P> z	Coef.		P> z	Coef.		P> z
		**	0.00				0.19	**	0.00
log(Labor)	0.290	*	0	0.326	***	0.000	6	*	0
FDI (dummy)	-	**	0.00	-	***	0.000	0.20	**	0.00
	0.248	*	0	0.394	***	0.000	5	*	0
		**	0.00				0.73	**	0.00
Export (%)	0.630	*	0	0.448	***	0.000	1	*	0
Patent (dummy)		**	0.02	-			0.27	**	0.00
	0.050	*	5	0.053	**	0.031	2	*	0
		**	0.00				0.09	**	0.00
log (Age)	0.152	*	0	0.158	***	0.000	8	*	0
	-	**	0.00	-			0.00		0.32
Market share	0.017	*	0	0.023	***	0.000	3		5
							0.46	**	0.00
KIBS							8	*	0
Number of obs			31,107			21,719			9,388
Uncensored obs			10,362			8,802			1,560
Wald chi2			1175.47			1273.35			48.19

Dependent variable: R&D decision (dummy)	All sectors		Manufacturing sector		Service sector	
	Coef.	P> z	Coef.	P> z	Coef.	P> z
Prob > chi2		0.000		0.000		0.000

Source: Author's analysis based on RDI survey from 2011 to 2018

Note: *** denotes a statistical significant at 1 percent level, ** denotes a statistical significant at 5 percent level, * denotes a statistical significant at 10 percent level

5.2 R&D Intensity Equation

The study estimated the R&D investment equation using the Heckman 2-step model (see Table 3). We found that the Lamda or Inverse Mill ratio calculated in the first step of the Heckman 2-step model significantly impacts the intensity of R&D investment in both the manufacturing and service sectors.

Looking at the entire sample, we find that the factors affecting R&D investment and a group of R&D capital decisions are in the same direction. Those factors are the number of employees and domestic market share. While foreign investment and exports have the opposite effect on R&D investment intensity,

Comparing the R&D intensity between the manufacturing and service sectors, we found that firm size, foreign investment, and patent licensing resulted in higher R&D investments in the manufacturing sector but not in the service sector.

Firm ownership has also been analyzed in terms of its effects on the decision to innovate. In general, previous studies have had dual findings. Some authors agree that firms with foreign ownership tend to perform more innovative activities. At the same time, other studies have shown that firms with a certain degree of foreign ownership do not perform innovation activities. Our results suggest that firms in the manufacturing

sector with foreign ownership (higher than 50 percent of capital) show a higher R&D intensity.

This result corresponds to previous discussions (Crespi and Zúñiga, 2010). Crespi and Zúñiga (2010) found that firms in Latin America with more than 10 percent foreign ownership are more prone to innovate and also have a higher rate of R&D intensity. These firms invest in R&D to adapt existing products to the local market. Lasserre, 2011). In contrast, our results found that foreign ownership has no distinctive effect on the propensity to innovate by service firms. Foreign ownership in these service firms might not play an essential role in innovating, as they might not follow an active R&D strategy.

Surprisingly, this study found that export experience reduces R&D intensity for both manufacturing and service firms. These results contradict those by Ebling (2000), Chaminade and De Fuentes (2012), and Fuentes et al. (2015), who found that active export behavior has positive effects on firms' R&D performance. In contrast, domestic market share has a positive impact on R&D intensity for both manufacturing and service firms. Service firms that invest more in R&D are more likely to serve domestic customer needs. The study also found that KIBS tends to have more R&D intensity.

Table 3: The estimation of the R&D intensity equation

Dependent variable: Log (R&D spending)	All sectors			Manufacturing sector			Service sector		
	Coef.		P> z	Coef.		P> z	Coef.		P> z
Log (Labor)	0.323	***	0.000	0.350	***	0.000	0.086	*	0.058
FDI (dummy)	0.287	***	0.000	0.299	***	0.000	0.151		0.154
Export (%)	-0.426	***	0.000	-0.431	***	0.000	-0.415	**	0.048
Patent (dummy)	0.067	*	0.057	0.112	***	0.002	-0.216	*	0.067
log (Age)	0.000		0.987	0.028		0.309	-0.033		0.608
Market share	0.042	***	0.000	0.074	***	0.000	0.014	**	0.013
KIBS (Dummy)							0.421	***	0.002

Mills : Lamda	-0.329	***	0.000	-0.385	***	0.001	-0.761	***	0.000
Number of obs			31,107			21,719			9,388
Uncensored obs			10,362			8,802			1,560
Wald chi2			1175.47			1273.35			48.19
Prob > chi2			0.000			0.000			0.000

Source: Author's analysis based on RDI survey from 2011 to 2018

Note: *** denotes a statistically significant at 1 percent level, ** denotes a statistically significant at a 5 percent level. * denotes a statistically significant at 10 percent level

5.3 Technological Innovation Equation

The study estimated various factors that affect the productivity of technological innovations using the Probit model. Estimated results show that, considering the total sample, R&D intensity increases the likelihood of productivity in product innovation or process innovation (see Table 4). The results show that the effects of R&D intensity are statistically significant on innovation output. R&D intensity impacts about 1.049 for manufacturing, and it reported an impact of about 0.322 for service firms. This result confirms those by Crespi and Zúñiga (2010), Griffith et al. (2006), and Raffo, Lhuillery, & Miotti (2008). It indicates that firms with higher R&D intensity per employee are more likely to introduce at least one product or process innovation.

Surprisingly, there is a comparison between Knowledge Intensive Services (KIBS) and other service businesses. This study found that the innovation output in KIBS was statistically lower than non-KIBS. The KIBs in Thailand that focus more on marketing innovation without technology development may have lower productivity.

Foreign ownership is the determinant of technological innovation, but only for manufacturing firms. Manufacturing companies with export experience in the service sector also have a higher R&D intensity as measured by expenditures.

Manufacturing firms with export experience have, in general, increased innovation output. However, firms in the service sector did not confirm this result.

Other factors positively correlated with the productivity of technological innovations include firm size, exports, cooperation with various sectors (including local suppliers, the parent firm, competitors, public research institutes, and universities), Measures to support technology and innovation from NIA and NXPO, including activities related to innovation, including the acquisition of machinery and software, the acquisition of external knowledge, training for innovative activities, the market introduction of innovations, and design activities. However, the factor that did not result in more significant innovation was being a multinational firm. Cooperation with foreign suppliers, private non-profits, and professional associations

When considering innovation outputs between manufacturing and services, the study found cooperation with parent firms and competitors, acquisition of external knowledge, market introduction of innovations, and incentive programs provided by BOI and NXPO. These factors have a more significant impact on the innovation output of the service sector than the manufacturing sector.

Our results show that public funds for innovation are essential for innovation activities across manufacturing and services. An open innovation strategy plays a critical role in innovation investment across all models in the services and manufacturing sectors. The findings support the idea of open innovation and reaffirm the importance of non-R&D activities for innovation in the service sector. Our results are similar to those of studies by Tether (2005), Aboal & Garda (2016), and Fuentes et al. (2015).

Service firms that access market sources of information invest more in R&D and innovation activities than firms that

do not benefit from this particular source of information. Surprisingly, this result suggests that spillovers from public data sources have a higher impact on service firms. To the extent that service firms can access free general information, they will increase their investment in innovation. We can argue that firms in the service sector will invest in innovation intensity to obtain information.

Table 4: The estimation of the innovation equation

Dependent variable : Technological Innovation (dummy)	All sectors		Manufacturing		Service	
	Coef.	P> z	Coef.	P> z	Coef.	P> z
R&D intensity (%)	0.718 ***	0.00	1.049 ***	0.00	0.322 **	0.03
log (Labor)	0.034 ***	0.00	0.036 ***	0.00	0.025 ***	0.00
FDI (dummy)	-0.014	0.17	-0.020 *	0.10	0.010	0.64
Export (%)	0.055 ***	0.00	0.059 ***	0.00	0.012	0.65
Local suppliers (dummy)	0.051 ***	0.00	0.052 ***	0.00	0.048 ***	0.00
Foreign suppliers (dummy)	0.001	0.91	0.013	0.31	0.034 *	0.10
Parent company (dummy)	0.028 ***	0.00	0.027 **	0.02	0.036 *	0.05
Private non-profit (dummy)	-0.003	0.85	-0.013	0.44	0.033	0.19
Competitors (dummy)	0.052 ***	0.00	0.046 ***	0.01	0.057 **	0.01
Professional associations (dummy)	-0.031 *	0.06	-0.030	0.12	0.032	0.32
Acquisition of machinery & software (dummy)	0.050 ***	0.00	0.061 ***	0.00	0.027 **	0.02
Acquisition of external knowledge (dummy)	0.107 ***	0.00	0.089 ***	0.00	0.138 ***	0.00
Training for innovative activities (dummy)	0.037 ***	0.00	0.047 ***	0.00	0.016	0.16
Market introduction of innovations (dummy)	0.061 ***	0.00	0.053 ***	0.00	0.073 ***	0.00
Design activities (dummy)	0.226 ***	0.00	0.228 ***	0.00	0.216 ***	0.00
BOI (dummy)	0.011	0.24	0.003	0.79	0.042 **	0.03
NIA (dummy)	0.096 ***	0.00	0.102 ***	0.00	0.084 **	0.05
NXPO (dummy)	0.149 ***	0.00	0.090 **	0.04	0.283 ***	0.00

Dependent variable : Technological Innovation (dummy)	All sectors		Manufacturing		Service	
	Coef.	P> z 	Coef.	P> z 	Coef.	P> z
Cooperation with PRIs (dummy)	0.109 ***	0.00	0.113 ***	0.00	0.098 ***	0.00
Cooperation with universities (dummy)	0.085 ***	0.00	0.085 ***	0.00	0.085 ***	0.00
KIBS (dummy)					0.045 **	0.03
The number of obs.	22,696		15,982		6,714	
Wald chi2	2377.09		1711.17		620.27	
Prob > chi2	0.0000***		0.0000***		0.0000***	

Source: Author's analysis based on RDI survey from 2011 to 2018

Note: *** denotes a statistically significant at a 1 percent level, ** denotes a statistically significant at a 5 percent level, * denotes a statistically significant at 10 percent level

5.4 Labor Productivity Equation

This study estimated the linkage of technological innovation productivity to productivity using the 2SLS model (see Table 5). This study found no problems: over-identification and weak instrumentation of the model.

Our results show that innovation output has a significant and positive impact on a firm's productivity for both service and manufacturing firms. However, differences arise in terms of the impact. Service firms seem to grasp more benefits from innovation output to increase their productivity. Technological innovation has a more powerful effect on fostering productivity in service firms than in manufacturing firms. Surprisingly, our results show a negative impact of non-technological innovation on firm productivity in both the service and manufacturing sectors. Contrast this with previous studies that point to the existence of complementarities between technological and non-technological innovation that foster firm productivity (Fuentes et al., 2015).

Firm size is an essential determinant of firm productivity. Our result suggests that smaller firms have higher productivity measured in terms of revenues per employee. Our result is

similar to those of Fuentes et al. (2015), which suggests that smaller firms might have more flexibility to introduce changes needed in a changing environment, thus positively affecting their productivity. Other factors that positively affect productivity are capital and firm age.

When comparing the manufacturing and service sectors, the study found that technological innovation produces more productivity in the service sector than in the manufacturing sector. These findings differ from Tether (2005) and Aboal & Garda (2016), which found that non-technological innovation is essential to productivity in the service sector, mainly traditional service businesses. This fact may partly be because most of the Thai service sector is traditional. They are SMEs that do not focus on technology but use low-skilled labor to provide services. The study also found that being a very old (experienced) entity increased productivity.

R&D investment in the manufacturing sector will generate more productivity gains than in the service sector. Service innovations cost less to develop, which is an opportunity for service providers, especially SMEs. We also found that KIBS has higher productivity than other businesses in the service sector.

Other factors, such as R&D investment in revenue, headcount, exports, acquisition of machinery and software, training for innovative activities, design activities, incentive programs provided by the NIA, and cooperation with PRIs, will affect productivity and innovation in the manufacturing sector rather than the service sector. Cooperation with universities and local suppliers has a different effect on innovation in the manufacturing and service sectors.

In sum, our results show that the effects of technological innovation and R&D intensity on innovation output and productivity are statistically significant for services and manufacturing. The results did not show a difference in terms

of significance between manufacturing and services. Technological innovation and R&D intensity have a higher impact on the complete service sample than on manufacturing firms. These results indicate that service firms can benefit from their investment in innovation and R&D activities when it comes to innovation output and productivity.

Table 5: The estimation of the labor productivity equation

Dependent variable : log (Revenue/Labor)	All sectors			Manufacturing			Service		
	Coef.		P> z	Coef.		P> z	Coef.		P> z
Technological Innovation (dummy)	0.471	***	0.00	0.41	***	0.00	0.43	***	0.00
Non-technological Innovation (dummy)	-	***	0.00	-0.07	***	0.00	-0.04	*	0.07
log (Labor)	0.668	***	0.00	-0.67	***	0.00	-0.68	***	0.00
log (Capital)	0.370	***	0.00	0.42	***	0.00	0.28	***	0.00
log (Age)	0.043	***	0.00	0.05	***	0.00	0.04	*	0.08
KIBS (dummy)							0.13	***	0.00
The number of obs.			22,626			15,934			6,692
Wald chi2			11141.07			8561.52			3378.55
Prob > chi2			0.000			0.000			0.000

Source: Author's analysis based on RDI survey in 2014

Note: *** denotes a statistically significant at a 1 percent level, ** denotes a statistically significant at a 5 percent level, * denotes a statistically significant at 10 percent level

6. Conclusion

This study investigates the determining factor of research and development (R&D) and the impacts of R&D on firms' innovation performance and productivity. This study analyzes the data from the Thailand R&D/Innovation Survey 2011–

2018 and applies a structural model that describes the link between R&D expenditure, innovation output, and productivity.

The results from the CDM model on innovation determinants and the impact of innovation on productivity show that innovation intensity has a substantial effect on innovation output, and innovation output also demonstrates a high impact on a firm's productivity. These results are consistent with those by Crépon, Duguet, and Mairesse (1998), Crespi and Zúñiga (2010), and De Fuentes et al. (2015), as firms that invest more in R&D and innovation activity and have more R&D intensity will have a higher propensity to produce innovations. Those firms also show higher productivity performance.

This study highlights the importance of promoting R&D activities and innovation as the basis for improved productivity among service firms in Thailand. This study also highlights some differences in R&D activities and innovations between the service sector and the manufacturing industry.

The policy recommendations are as follows: Firstly, our findings show that the firms' resource base is vital for innovation. Therefore, the government should promote supply-side measures for service innovation, such as increasing money. Research and development people should increase the efficiency of R&D in government research units and motivate R&D investment in the private sector. The government should use demand measures to boost technology development in service businesses. Moreover, service firms are small and lacking resources, so the government should promote open innovation by encouraging the exchange of knowledge in various forms of cooperation and promoting a robust service innovation system.

Second, the driving forces of service innovation are the firms' executives' intentions to innovate. Competition and

integration as part of the global service value chain will force domestic firms to develop innovation and improve productivity. Therefore, the government should promote competition in the service sector. Liberalizing services sector markets would strengthen the competitiveness of the services sector and boost productivity not only in the service sector but also in the manufacturing sector, which relies on these services as input (Suzuki et al., 2020).

Third, there is a link between R&D activities, service innovation, and productivity, so if Thailand wants to promote innovation in the service sector, the government should encourage R&D activities in the service sector. R&D activities in the service sector are different from those in the industry. Technological innovation plays a vital role in increasing the productivity of the service sector. The Thai government should not promote non-technological innovation activity alone. R&D activities are not the only focus of innovation policies in the service sector. Tax incentives for encouraging R&D are more difficult to use for small service firms and favor large-scale, capital-intensive manufacturing firms. Thai governments should have a broader definition of promoted research and development activities. The government should also promote non-R&D technology development activities.

Finally, this study has several limitations, such as the underutilization of panel data that can better analyze the drivers of innovation and its effect on innovation output and productivity. Moreover, this study explores the differences between the service and manufacturing sectors. Further study should classify subsectors into KIBS and traditional service sectors and hi-tech and low-tech manufacturing sectors.

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Appendix: Descriptive Statistics

Table A: Descriptive Statistics

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Dependent Variables						
R&D decision (dummy)	A dummy that equals 1 if the firm decided to carry out R&D activities	35,4 55	0.34	0.47	0	1
R&D intensity	A proportion of R&D spending to revenue	34,6 34	0.01	0.05	0	0.88
Technological innovation (dummy)	A dummy that equals 1 if the firm performs product or process innovation	25,9 88	0.30	0.46	0	1
Income/Labor	A proportion of income to labor	33,7 50	3.57E +07	5.06E+09	0	9.29 E+1 1
Independent Variables						
Labor	The number of employees	34,3 73	361.9 0	1306.81	1	700 00
FDI (dummy)	A dummy that equals 1 if the firm has more than 50 percent of foreign investment	35,3 79	0.16	0.37	0	1
Export	A proportion of export to total revenue	35,4 55	0.19	0.31	0	1
Patent (dummy)	A dummy that equals 1 if the firm has at least one patent	35,4 55	0.13	0.34	0	1
Age	Firm age	35,3 28	20.67	11.75	1	208
Market share	The percentage of a market's total sales, that is earned by a particular company over a specified time period	34,7 90	0.01	0.04	1.24 E-11	0.99
Local suppliers (dummy)	The importance for the cooperation with "local suppliers"	35,4 55	0.20	0.40	0	1
Foreign suppliers (dummy)	The importance for the cooperation with "foreign suppliers"	35,4 55	0.13	0.34	0	1
Parent company (dummy)	The importance for the cooperation with "parent company"	35,4 55	0.12	0.33	0	1

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Private non-profit (dummy)	The importance for the cooperation with "private non-profit"	35,4 55	0.05	0.22	0	1
Competitors (dummy)	The importance for the cooperation with "competitors"	35,4 55	0.06	0.24	0	1
Professional associations (dummy)	The importance for the cooperation with "professional associations"	35,4 55	0.05	0.22	0	1
Acquisition of machinery& software (dummy)	Acquisition of machinery, equipment (including computer hardware), and software for improving new product or process	25,9 88	0.37	0.48	0	1
Acquisition of external knowledge (dummy)	Acquisition of other external knowledge (purchase or licensing of patents and non-patented inventions, know-how, and other types of knowledge from other enterprises or organizations including consultants) for improving new products or processes	25,9 88	0.09	0.29	0	1
Training for innovative activities (dummy)	Training for innovative activities (internal or external training for your personnel specifically related to the development of innovation)	25,9 88	0.33	0.47	0	1
Market introduction of innovations (dummy)	Market introduction of innovations including market research, changes to marketing methods, and launch advertising and branding development	25,9 88	0.19	0.39	0	1
Design activities (dummy)	Design activities for the development or implementation of new or improved goods, services or processes	25,9 88	0.15	0.35	0	1
BOI (dummy)	Services provided by BOI	35,4 55	0.14	0.34	0	1
NIA (dummy)	Services provided by NIA	35,4 55	0.02	0.13	0	1
NXPO (dummy)	Services provided by NXPO	35,4 55	0.01	0.07	0	1

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Cooperation with PRIs (dummy)	A dummy that equals to 1 if the firm cooperate with PRI (ex. conduct joint research projects, use of licensed technologies, use of analytical and testing services etc.)	35,4 55	0.15	0.35	0	1
Cooperation with universities (dummy)	A dummy that equals to 1 if the firm cooperate with university (ex. conduct joint research projects, use of licensed technologies, use of analytical and testing services etc.)	35,4 55	0.09	0.29	0	1
Non-technological innovation (dummy)	A dummy that equals 1 if the firm performs organizational or marketing innovation	25,9 88	0.68	0.47	0	1
Capital (Baht)	Capital	35,3 93	7.17E +08	2.95E+10	10,0 00	4.86 E+1 2

Source: Author's analysis based on RDI survey in 2011-2018

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The CPTPP and Vietnam: Impact, Covid-19 Pandemic and Causes of Resilience

Tran Van Hoa

Professor, Victoria University
Australia
jimmy.tran@vu.edu.au

Jo Vu

Victoria University Business School
Australia

Pham Quang Thao

Vietnam Union of Science and Technology Associations

ABSTRACT

The paper assesses, using national accounting and UNCTAD data, the impact of the CPTPP on Vietnam since its ratification on 14 January 2019, through the Covid-19 pandemic and the country's surprising observed resilience. It first briefly summarises the main features of the CPTPP and then discusses the empirical evidence of the major effects on Vietnam through three main pillars of open-market growth (commodity trade, foreign direct investment, and service trade) that the country had experienced to 2023. It finally analyses useful lessons learned to enhance the agreement's major benefits or to mitigate the consequences of adverse crises. Importantly, it suggests the opportunities and challenges not only for Vietnam but also for potential new participating members.

Keywords: CPTPP, free trade agreements, revealed comparative advantages, economic and trade policy.

JEL Classification: F13, F15, F43, F62

1. Introduction

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is a mega free trade agreement (FTA) for economies in the Pacific Rim. It is one of many other bilateral and plurilateral FTAs in the region to promote trade and growth in the context of regional economic integration and globalisation of the new international trade (WTO, 2023). The CPTPP commenced on 30 December 2018 initially with six members: Australia, Canada, Japan, Mexico, New Zealand and Singapore. It entered into force for Vietnam on 14 January 2019 and for Peru on 19 September 2021. The CPTPP also includes Malaysia (29 November 2022), Chile (21 February 2023), and the United Kingdom (31 March 2023) (DFAT, 2023). The CPTPP will enter into force for Brunei Darussalam 60 days after they complete their respective ratification processes. Prospective new members for ascension to the CPTPP include China, Indonesia, the Philippines, South Korea, and Taiwan (PIIE, 2022). Globally, the importance of the CPTPP as a trading bloc is significant. At the end of 2022, the CPTPP has a total population of 499 million or 6.7 per cent of the world population, a total GDP of USD10.6 trillion or 13.3 per cent of the global GDP, and its trade accounts for 14.4 per cent of the world trade (DFAT, 2023).

The paper will focus on the CPTPP and its impact on Vietnam, a major high-growth transition economy in Asia, since its membership and importantly during the global Covid-19 pandemic that started early in 2020. It will critically discuss the major lessons learned to enhance the CPTPP benefits and mitigate the consequence of adverse crises. It will also assess the opportunities and challenges for Vietnam and also possible use by other current and potential new CPTPP members for useful regional and global trade and economic

integration policy analysis even in the current context of emerging re-globalisation (WTO, 2023).

The plan of the paper is as follows. Section 2 briefly describes the CPTPP's origin and main objectives and member commitments. Section 3 looks at the impact of the CPTPP on Vietnam on three growth pillars of current economic integration or open-market, namely commodity trade, foreign direct investment (FDI) and services, and briefly institutional reforms. Section 4 briefly describes the major lessons learned and how Vietnam (and other current and interested CPTPP members) can make good use of them for strategic policy analysis. It also suggests opportunities and challenges for regional and global policy analysis and implementation consideration in the context of emerging re-globalisation amid the Covid-19 pandemic and global geopolitical crises. Section 5 concludes.

2. The CPTPP and its Major Features

The CPTPP can be regarded as an off-shoot of the original Trans-Pacific Partnership (TPP or TPP12) in which the US was involved, in addition to the CPTPP's 11 members (TPP, 2022). After the withdrawal of the US from the TPP under US President Donald Trump in 2017, discussions on the continuation of the contracted TPP were led chiefly by Japan. The ratification of the contracted TPP, or CPTPP, was officially ratified by its six members on 30 December 2018 and then by other members as described earlier.

It should be noted that the CPTPP is a separate treaty that incorporates, by reference, the provisions of the original TPP signed by Ministers on 4 February 2016 in Auckland, New Zealand. Under the CPTPP, signatories have implemented the original TPP between them, with the exception of a limited number of provisions which will be suspended. Suspensions

will remain in place until the members agree to end them, by consensus (DFAT, 2023).

The objectives of the CPTPP are overarching and comprehensive and include: maintaining open markets, increasing world trade, creating new economic opportunities for people of all incomes and economic backgrounds, promoting further regional economic integration and cooperation between them, and enhancing opportunities for the acceleration of regional trade liberalisation and investment (CPTPP, 2023).

To cover all these objectives, the CPTPP text has 27 chapters, dealing with topics such as the liberalisation (or tariff reduction or free flows) of the three economic integration growth pillars: goods, investment and services. Related topics include the chapters on intellectual property, labour, government procurement, environment, competition policy, state-owned-enterprises (SOEs), small-and-medium-size-enterprises (SMEs), and e-commerce.

The CPTPP members' commitments are to implement all the provisions of these chapters with a few exceptions related to national interests (DFAT, 2023).

3. Impact of the CPTPP on Vietnam

An analysis of the impact of the CPTPP on its members and especially Vietnam as our focus since 2019 is complicated by a number of factors. First, Vietnam and other CPTPP members have also ratified a number of other bilateral and plurilateral FTAs (16 in the case of Vietnam, USDA, 2022) which simultaneously have some significant impact. Second, due to the short time span since the ratification, national and international account data are not sufficiently available. For example, the latest IMF data available on trade at the time of writing is April 2020 for the IMF (2023) or December 2020 for the UNCTAD (2023). Third, the impact of the CPTPP was

also affected by the emergence of the Covid-19 pandemic starting in early 2020 that has generated serious global supply chain disruptions and demand shocks and declining GDP. With this caution, we can nevertheless present the following observations from relevant pre- and current Covid-19 data and analysis that cover the key specific areas of GDP, commodity trade (exports and imports), FDI, services, and institutional reforms. Due to the serious effects of the COVID-19 outbreak on these areas since 2020, mention of the CPTPP impact due to this outbreak is only minimal or not attempted.

First, on the strictly calibrated level of computable general equilibrium simulations for growth and trade under regular economic conditions, several studies have discussed this CPTPP impact (e.g., Lee and Bhattacharya, 2019; Nguyen and Truong, 2019). The World Bank more specifically projected that, in 2030, Vietnam under the CPTPP will potentially gain 1.1 per cent in GDP, 4.2 per cent in exports and 5.3 per cent in imports or, respectively, 3.5, 6.9 and 7.6 per cent with productivity kick in (Maliszewska et al, 2020). These outcomes are however much less than those under the original TPP,

Second, on the realistic level analysis based on available data however, Suominen (2021) for example has observed that, during 2017-2020, the fluctuations of CPTPP members' exports to the CPTPP region mirrored their global exports. Interestingly, while other CPTPP counties appeared to have been negatively affected by the Covid-19 pandemic, Vietnam scored new export gains of 264.3bn, 282.6bn and 335.9bn in 2019, 2020, and 2021 respectively, and import gains of 253.4bn, 262.7bn and 331.6bn for the same period (IMF, 2023). More specifically, in 2019, the first year of the CPTPP's implementation, members' trade in the CPTPP region dropped by 4.0 per cent, with the exception of Vietnam that posted a 7.0 per cent growth. Vietnam notably gained in

manufactured exports to the CPTPP, especially to Japan. In 2020, amid the Covid-19 outbreak, all CPTPP members' exports to the bloc declined, Vietnam benefited with increased exports especially from global demand for phones, electronics, and computers (Suominen, 2021). Vietnam has been growing its imports from within the CPTPP—but also from the rest of the world (IMF, 2023).

In terms of FDI, the CPTPP provides staunch protections and national treatment to foreign investors, which could help boost FDI inflows, especially in export-driven sectors in developing member states. FDI flows to Vietnam, in particular, have withstood the Covid-19-induced global slump in FDI. Vietnam scored a 7.0 per cent gain in FDI inflows in 2019, the highest growth in 10 years, led by South Korean and Chinese investors. Covid-19, however, slammed the region's FDI just as it undercut global FDI inflows in 2020, and Vietnam's flattened, though Vietnam did keep pulling in FDI nearly at 2019 rates, especially from China in its industrial zones (Suominen, 2021). More specifically, the FDI inflows into Vietnam were USD16,120m, USD15,800m and USD15,660m in 2019, 2020 and 2021 respectively indicating the resilience of Vietnam in attracting capital inflows to support its economy especially its trade-induced sectors even during the pandemic (UNCTAD, 2023a).

In services, the picture is somewhat different. Before the deal entered into effect, the largest CPTPP members grew their commercial services and particularly digitally deliverable services trade with each other, with Singapore and Japan leading the way (Suominen, 2021). It should be noted that the CPTPP liberalises trade in services and cements free cross-border data transfer and trade in digital goods, which could be expected to fuel trade in digitally deliverable services. This has been an area of robust growth for CPTPP members' bilateral flows (Suominen, 2021). From the more

recent available data (UNCTAD, 2023b), we note that Vietnam's export of services was recorded positively, in 2020 and 2021 respectively, at USD6735m and USD3673m, and import at USD18,325m and USD19,407m. These outcomes reflect likely the combined impact of the CPTPP and the Covid-19 emergence. They were attained nevertheless while the whole developing Asia and Oceania region posted a growth rate 21.9 and 16.6 per cent for service exports and imports respectively in 2021.

As it stands, the CPTPP with its commitments and perceived benefits, will help Vietnam to boost domestic institutional reform, operate a market economy in a comprehensive manner and create a transparent and open investment and business environment. Institutional regulatory reform will bring a lot of benefits to Vietnam so this is seen as a mandatory requirement when Vietnam agrees to join the common playing ground. The country needs therefore to keep up the quality and momentum of reform after its entry to the trade pact. These are long-term concerns. Joint efforts between the government and businesses are required (Vietnamnet, 2022). The vexed issue of state-owned-enterprises is however a suspended provision of the CPTPP as in the original TPP.

4. Lessons Learned, Challenges and Opportunities

The above data and discussion appear to indicate that an analysis of the impact of CPTPP on Vietnam in recent years is complex due to the short time span since its ratification and multiple FTAs, and, importantly, the simultaneous effects on supply and demand of the global outbreak of Covid-19. Based on the available statistics and detailed scholarly studies however, we note that Vietnam has particularly mitigated

reasonably well the consequences of the pandemic and nevertheless retained some of the perceived benefits of the CPTPP (and probably other on-going regional and global trade agreements such as the Indo Pacific Economic Framework) after its ratification. What are the likely contributing supports for this outcome and the resilience of Vietnam's economy during crises with relevance to other current and interested CPTPP members?

We understand that in its recent development history, Vietnam has benefitted enormously in enhanced trade, high growth, substantial poverty reduction, and remarkable institutional reforms. These are attributed to the country's Doi Moi policy introduced in 1987 after a long stagnant period after the prolonged war to create a free market with a socialist orientation (Tran and Harvie, 1997). As a member of the ASEAN FTA in 1995, the WTO in 2007, and many other FTAs (see above), the structure of Vietnam's economy has transformed significantly making good use of its abundant natural resources, plentiful young and educated labour force, capable public service and appropriate regulatory reforms. The end results from all these are high trade openness, increased capital inflows and a growing supporting service sector. These are the three principal growth components in the field of economic integration and globalisation (WTO, 2023). Crucially but less noticeably by many economic and trade researchers and analysts is the outcome of this policy in the improvement in competitiveness (productivity) of the country's exportable agricultural, manufacturing and service sectors.

A good level of competitiveness is the foundation of a country's beneficial trade in goods, capital and services. It also embodies the resilience of Vietnam's globalised economy in the face of the volatility of supply and demand conditions, and the disruptive impact of regional and global crises. In

other words, the gains from trade and the country's resilience can be arguably attributable to Vietnam's high level of competitiveness for exportable goods, capital flows and service that have been achieved during its development process and reforms in the past three and half decades. As productivity is a complex measurable concept, supporting evidence for this beneficial competitiveness can be found from the UNCTAD 2023 databases in the form of revealed comparative advantage indexes for Vietnam's representative products. These indexes for 2021 are given in the table below. The attractiveness of the country's FDI and services which is important to Vietnam's trade sector arises from its economic reforms and sustained high and stable growth (Tran and Harvie, 1997), appropriate legal investment reforms and education and training policies (Tran, 2020).

Table 1. Vietnam's International Competitiveness:
Representative Revealed Comparative Advantage Index,
2021

Product	Index
[752] Automatic data processing machines, n.e.s.	1.19036519
[759] Parts, accessories for machines of groups 751, 752	4.78411207
[761] Television receivers, whether or not combined	2.7288572
[763] Sound recorders or reproducers	3.46846769
[764] Telecommunication equipment, n.e.s.; & parts, n.e.s.	5.75833227
[771] Electric power machinery, and parts thereof	1.10911524
[773] Equipment for distributing electricity, n.e.s.	2.36271252
[776] Cathode valves & tubes	1.10204947
[821] Furniture & parts	3.72483029
[831] Travel goods, handbags & similar containers	3.43241307
[841] Men's clothing of textile fabrics, not knitted	6.40909414

Product	Index
[842] Women's clothing, of textile fabrics	4.64316383
[843] Men's or boy's clothing, of textile, knitted, croche.	6.07749134
[844] Women's clothing, of textile, knitted or crocheted	5.3952472
[845] Articles of apparel, of textile fabrics, n.e.s.	4.91363383
[846] Clothing accessories, of textile fabrics	1.57934524
[848] Articles of apparel, clothing access., excluding textile	1.31268112
[851] Footwear	10.2550188
[871] Optical instruments & apparatus, n.e.s.	1.64126689
[881] Photographic apparatus & equipment, n.e.s.	21.0222218

Source: UNCTAD (2023).

From the table, all of these indexes far exceed unity or the world's ratio. These indicate the dominance of Vietnam's commodity trade in free trade agreements such as CPTPP and, fundamentally, the country's resilience amid damaging crises such as Covid-19.

5. Conclusion

The paper has discussed the main issues of CPTPP in the context of regional economic integration (WTO, 2023) and how its impact on Vietnam as measured by the three globalisation pillars of growth after its ratification in 2019. Supported by relevant data and studies, the paper shows that the impact had been beneficial after the ratification in 2019 and the country has shown resilience during the Covid-19 crisis. It also argued that these achievements and characteristics of the Vietnamese economy are attributable essentially to its successful development processes that include openness policy and legal and institutional reforms since the landmark Doi Moi. As a result, the country has achieved desirable high global competitiveness in the form of

high revealed comparative advantages. These characteristics are critical for trade and subsequently and necessarily for sustainable growth, development, poverty reduction, income distribution, political stability and common prosperity,

As trade and its gains exist whenever comparative advantages (or national differences in productivity) are present and relevant economic-theoretic conditions such as free flows of trade, FDI and services are satisfied, globalisation and FTAs such as CPTPP still retains its attractiveness as major national economic policy. The current discussions and conversations (e.g., WEF, 2022; WTO as reported in *The Economist*, 2022; Kimura, 2022; Krugman, 2022) on de-globalisation or re-globalisation refer usefully and primarily to the potential reduction of violation of these necessary conditions to increase comprehensive trade and supply chains that may lead to improvement in common prosperity, inclusiveness, and climate change issues especially for the current emerging global focus on digital trade amid the lingering Covid-19 pandemic and regional conflict in Europe.

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Fostering Active Ageing in Thailand's Informal Economy: A Policy Imperative

Euamporn Phijaisanit

Professor, Faculty of Economics, Thammasat University,
Thailand

euamporn@econ.tu.ac.th

ABSTRACT

Ageing societies pose a unique challenge for Thailand, where a large informal sector excludes most workers from mandatory retirement ages and social security coverage. While extending retirement ages is a pertinent consideration for the formal sector, policy considerations should also encompass the informal sector. Specifically, policies should strive to enhance the physical and cognitive abilities of older workers in the informal sector through appropriate guidance, empowering them to prolong their working years and bolster their financial security. Despite the availability of voluntary social security schemes, enrollment rates among informal workers remain low due to a combination of factors, including lack of awareness, perceived benefit inadequacy, financial burden, and reliance on alternative social welfare programs. Even those receiving the government's old-age allowance may struggle financially.

This article highlights the underutilized potential of Thailand's extensive informal sector as a source of employment opportunities for older adults. Despite cross-country data suggesting a positive association between a large informal sector and high elderly employment rates, Thailand's labor force participation rate (LFPR) for individuals aged 65 and above remains comparatively low among similar developing nations. Furthermore, the LFPR decline for people transitioning from age group 55-64 to 65 and above is sharper in Thailand than in many other countries. The Active Ageing Index (AAI) can serve as a tool to investigate the factors contributing to Thailand's relatively low old-age LFPR by evaluating active ageing scores across various aspects. By identifying the missing elements in specific localities, the AAI and its sub-indices can guide local-area policy prioritization

to address these gaps and enhance national policy effectiveness in promoting higher LFPR in old age. Fostering an active-ageing ecosystem within the informal sector will empower older individuals to continue working for longer periods and mitigate poverty risks in their later years.

Keywords: Active Ageing, Informal Economy, Ageing Society, Labor Force Participation, Thailand

1. Background and Introduction

As the world confronts the challenges of an ageing population, retirement age has emerged as critical policy issue. Unlike developed countries where retirement age is a central concern, Thailand faces a unique challenge. For the majority of Thai workers, retirement age is not a significant issue. In 2018, a staggering 65% of all employment in Thailand falls within the informal sector (ILO, 2023). The prospect of maintaining financial independence persists into their later years, provided they maintain physical and cognitive well-being. Therefore, the notion that retirement leads to old-age poverty does not fully capture the reality for most Thai workers and many of those in developing countries. In many cases, existing old-age poverty stems from earlier periods of poverty during their working years, before the age of 60. This accumulated poverty becomes more severe in later years, highlighting the need for early interventions rather than solely focusing on retirement age. Without adequate support during their working years, many elderly individuals may lack the capacity to extend their working lives. Even with pension or old-age allowance eligibility, those who cannot continue to work may face income insecurity.

Thailand's vast informal economy holds immense potential, particularly in terms of work and employment opportunities for older adults. This potential remains largely underutilized. Aside from restructuring within the formal economy, the government can effectively address the challenges of an ageing society by fostering an active-ageing ecosystem within the informal sector. This approach will enhance income security for older adults and mitigate the risk of poverty in their later years. To effectively design relevant policies, indicators such as the Active Ageing Index (AAI) and its sub-indices can serve as valuable tools. The AAI helps identify the factors that should be prioritized for urgent

development in the localized context. This data-driven approach ensures that policies are tailored to the unique needs of each area.

The subsequent section delves into the discourse on the informal economy and its implications for the overall economy and the quality of life of workers. The third section presents an overview of the ageing labor force in Thailand. This is followed by a comparative assessment of the informal sector and labor force participation rate (LFPR) among the selected countries, utilizing stylized statistical representations. The paper proceeds to explain the application of AAI as a policy tool, identifying the missing elements in the localities where policy should prioritize. The concluding section provides policy recommendations from the perspective of the informal sector in the context of Thailand.

2. A Brief Review of the Discourse on Informal Economy

The term "informal economy" encompasses all economic activities undertaken by workers and economic units that are either legally or practically excluded from formal arrangements. These activities may fall outside the purview of the law, indicating operation beyond the formal legal framework. Alternatively, they may nominally fall within the legal framework but remain uncovered due to inadequate enforcement or overly burdensome regulations that discourage compliance (ILO, 2015).

The International Labour Organization (ILO) defines informal employment as encompassing three distinct groups: individuals without social security or employment benefits, entrepreneurs operating within informal units, and contributing family workers without separate wages. In contrast, formal employment refers to work meeting none of

these criteria, offering social security, benefits, and independent legal status.

Informal employment, encompassing approximately 2 billion workers, representing 60% of the global labor force, constitutes a significant aspect of the economic landscape (Delechat & Medina, 2021). While prevalent in emerging and developing economies, informality also exists in developed nations. The majority of informal workers, around 85%, are engaged in precarious employment situations within small production units, often driven by a lack of opportunities in the formal sector (ILO, 2018).

The pervasiveness of informal employment has significant macroeconomic consequences. Informal firms, typically small and unproductive, contribute minimally to the tax base, hindering government revenue generation (Joshi et al, 2014; World Bank, 2019). Limited fiscal resources constrain governments' ability to provide adequate coverage for social protection programs, comprehensive public services, and business cycle improvements (World Bank, 2020). Consequently, countries with high levels of informality experience lower growth rates and struggle to collect sufficient taxes, further perpetuating informality (Ohnsorge & Yu, 2022).

Economies with a large informal sector typically exhibit lower levels of development and workers' living standards. Informal workers are more likely to experience poverty and earn lower wages compared to their counterparts in the formal sector (World Bank, 2019). This disparity is further exacerbated by their lack of social protection and access to credit. Consequently, human development indicators such as life expectancy and maternal mortality tend to be lower in economies with a large informal sector. Youth often face challenges in securing formal employment due to limited experience and qualifications, while older workers may

transition to informal work as they approach retirement or face age-related discrimination (OECD/ILO, 2019).

Despite misconceptions, the informal economy significantly contributes to tax revenue and economic growth. Studies show no negative correlation between informality and tax revenue when considering development levels. Informal workers contribute through indirect taxes, presumptive taxes, and their connections to the formal economy. They also contribute to local public goods through informal taxation systems. Additionally, the informal sector drives economic growth by producing goods and services, creating employment, and transferring hidden subsidies to the formal economy. These contributions can reach 30% of GDP in agriculture and 17% in non-agricultural sectors (OECD/ILO, 2019).

3. The Characteristics and Well-being of Thailand's Ageing Labor Force

The Survey of the Older Persons in 2021, conducted by the National Statistical Office (NSO) (2022), provides insights into the labor market participation and employment characteristics of Thailand's older population. Thailand's demographic landscape is characterized by a rapidly ageing population, with approximately 13.4 million older persons aged 60 and above, constituting 19.6% of the total population in 2021. This ageing trend is reflected in the steady rise of the old-age dependency ratio, which reached 30.5% in 2021 and is projected to reach 55% by 2040.

Despite this ageing trend, labor market participation among older persons remains significant. Approximately 34.7% of the total older population reported working in the past seven days, representing a modest decrease compared to 2017 (35.%) (NSO, 2022). Self-employment is the dominant

form of employment among older workers, with 64.8% engaged primarily in the agricultural, forestry, and fishery sectors. The reasons why older persons continue to work from the survey may be collectively grouped as: "work without necessity" (physical capability, making good use of time, etc.) and "work out of necessity" (income needed for family, children, debt, etc.). Approximately half of older workers reported working out of necessity, highlighting the need for income generation to meet basic living expenses. This is further supported by their self-evaluation of income sufficiency. Based on their subjective assessment without formal monetary benchmarks, close to half of the older population reported income insufficiency, with a higher prevalence in rural areas outside the municipality.

Public assistance programs significantly influence the well-being of older adults beyond income and employment factors. Notably, Thailand's informal workers enjoy a comparatively higher level of protection through its universal healthcare system, as compared to informal workers in other developing countries. Moreover, to extend social protection beyond formal employment, the government has introduced voluntary contributions to the Social Security Fund (SSF) for informal sector workers (Section 40 of the Social Security Act). Despite the Social Security Act's mandate, informal workers face several enrollment barriers: lack of awareness, inadequate perceived benefits, and perceived financial burden.

4. A Comparative Assessment of the Ageing Labor Force Participation in Thailand

Thailand's population ageing is occurring at a relatively low-income level compared to other ageing East Asian economies like Hong Kong, Japan, Korea, and Singapore. This raises concerns about the country's ability to support its growing elderly population and address the potential

economic slowdown associated with a shrinking working-age population. According to Moroz et al (2021) population ageing could have a negative impact on Thailand's economic growth. Projections suggest that, without policy adjustments, demographic changes alone could reduce growth in GDP per capita by 0.86% in the 2020s.

Moreover, Thailand's labor market, once a vibrant hub of economic activity, faces a declining total labor force participation rate from 70.27% in 2013 to 67.54% in 2022. However, it can be observed that despite the decline in the total participation rate, the labor force participation rate of those aged 65 and above have seen an increasing trend (Table 1). This divergence in participation rates underscores the importance of considering the dynamics of the elderly workforce in Thailand's ageing landscape.

Table 1. Labor Force Participation Rate (LFPR) in Thailand

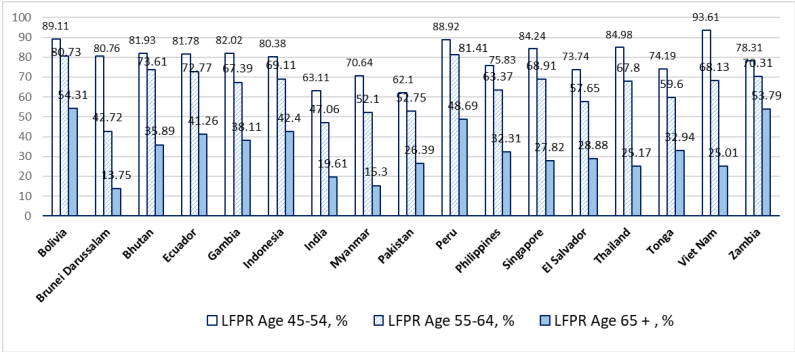
	Total LFPR, %	LFPR Age 55-64, %	LFPR Age 65+, %
2013	70.27	69.14	25.66
2020	67.02	67.70	25.72
2021	66.94	68.06	26.42
2022	67.54	68.61	26.49

Source: ILO Stat (ILO, 2023), compiled and rearranged by the author.

The labor force participation rate (LFPR) is calculated by dividing the number of people in the labor force (employed and unemployed) by the working-age population (usually 15 and older) (see detail of the calculation in Bourmpoula et al, (2013)). In developing nations, the lack of adequate income security and social welfare compels older individuals to remain active in the workforce, resulting in significantly higher LFPR compared to developed countries. Despite their

substantial contribution to household finances, older workers in developing countries, particularly in low-income regions, face declining remuneration as they age (Barrientos et al, 2003). Previously, Arifin and Anata (2009) drew attention to Thailand's relatively high labor force participation rate (LFPR) among individuals over 60, surpassing that of neighboring Southeast Asian economies such as Singapore, Indonesia, and Brunei Darussalam. However, recent estimations in 2018 indicate that Thailand's old-age LFPR has declined below that of Singapore and Indonesia, while still remaining higher than Brunei and Myanmar and close to Vietnam (Figure 1). When examining the LFPR change between the age groups of 55-64 and 65 and above, Thailand, along with Brunei, Vietnam, and Myanmar exhibit the most significant negative shift. This suggests that a relatively high proportion of older workers in these countries have exited the workforce as they have aged.

Figure 1. Labor Force Participation Rate in Thailand and Selected Countries, 2018



Source: ILO Stat (ILO, 2023), compiled and rearranged by the author.

An analysis of the relationship between the informal sector and the labor force participation rate (LFPR) among

individuals aged 65 and above in 82 selected countries reveals a strong positive Pearson’s correlation of 0.74. This finding is further supported by the regression analysis, which indicates that for every 1% increase in informal employment, there is an average 0.36% increase in the LFPR among individuals aged 65 and above (Table 2). The goodness-of-fit test demonstrates that the model effectively explains 54% of the variation in the old-age LFPR. Additionally, the Analysis of Variance, where F-statistics of 94.29 exceeds the critical value, confirms the overall significance of the model. The strong positive correlation between informal employment and LFPR among individuals aged 65 and above, coupled with the significant regression results, underscores the importance of the informal sector in supporting the labor force participation of older workers. It can be observed that the potential of Thailand's informal sector remains underutilized. By fostering the growth and development of the informal sector, Thailand can harness its potential to support the economic security and well-being of its older population.

Table 2 Ordinary Least Squares Regression

Dependent variable: LFPR Age 65 and above, %

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	4.448599889	2.0033873	2.220539128	0.02924709
Informal Employment, %	0.364914692	0.037580415	9.71023571**	4.0213E-15

** Significant at the 0.05 level

Source: Data from ILO Stat (ILO, 2023), author’s calculation.

5. Utilizing the Active Ageing Index (AAI) as an Indicative Policy Tool

Research has shown that appropriate employment can lead to active ageing and vice versa; and active ageing requires supportive policies (OECE, 2006; Parent-Thirion, 2014;

Myck, 2015, Phijaisanit, 2015; Magnavita, 2017). An example of the effectiveness of a macro-level policy linked to the degree of active ageing is the case of tax breaks for hiring older adults. In Thailand, one of the measures implemented is the corporate income tax deduction for hiring senior employees, as stipulated in the Revenue Code (No. 639) B.E. 2560. It was found that the provinces with increasing employment have higher active ageing score, compared to that in provinces with declining private sector employment after the policy was implemented in 2016 (Phijaisanit, 2021).

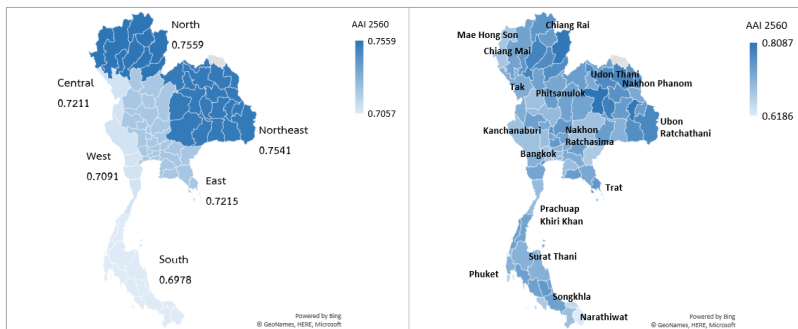
A report by the United Nations Economic Commission for Europe (UNECE) and the European Commission (2019), building on the lessons of their first report in 2015 (UNECE & European Commission, 2015), developed the Active Ageing Index (AAI) using the WHO's Active Ageing framework as the basis for converting it into different components of the composite index as a benchmark for comparing the quality of life of older people in the European Union.

The composite index, AAI, consists of 22 indicators, divided into four dimensions to reflect the characteristics of active ageing: (1) employment, (2) social participation, (3) independent, healthy and secure living, and (4) enabling environment for active ageing. It is a widely accepted tool for designing effective ageing policies in many countries, particularly in the European Union, the People's Republic of China, and the Republic of Korea, both at the national and local levels (UNECE & EC, 2015, 2019; Breza & Perek-Bialas, 2014; UNECE, 2012; Zaidi et al, 2017, 2019).

The development of the Active Ageing Index (AAI) in Thailand has been characterized by a gradual expansion of its scope and complexity. Early research focused on three dimensions of active ageing: health (HI), participation (PI), and security (SI) (Thanakwang & Soonthorndhada, 2006;

Chansarn, 2012; Saengprachaksakula, 2014). The National Statistical Office (2017) subsequently incorporated a fourth dimension, "enabling factors for active ageing," (EI) in its AAI calculations. This dimension captures indicators such as access to information and communication technology (ICT) and literacy. Most findings reveal that the level of active ageing of Thai elderly people is mostly at a moderate level.

Figure 2. AAI classified by region and province in Thailand, 2017



Source: Phijaisanit (2021), modified from Figure 9, p. 60 and Figure 17, p.

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Phijaisanit's (2021) extended utilization of Active Ageing Index (Figure 2) pinpoints regional disparities in Thailand, guiding local policy interventions. Prioritizing active ageing is necessary in the West and South, with specific needs addressed based on sub-indices: the Northeast on public health (HI), the West and South on transportation (PI), and the South on elderly security (SI). The North should benefit from lifelong learning initiatives (EI). This data, also available at the provincial level, empowers targeted policy crafting, complementing national initiatives and enhancing both active ageing and older adults' financial security.

6. Conclusion and Policy Implications

Thailand's ageing society presents a distinct set of challenges compared to developed countries where retirement age is a central concern. This is primarily due to the substantial informal sector, where income security is not contingent on formal retirement plans or age limitations. Consequently, the prevalence of old-age poverty often originates from earlier periods of financial hardship during the working years, underscoring the necessity for early interventions and proactive measures rather than an exclusive focus on retirement age policies. The fundamental challenge lies in empowering older adults to preserve their physical and cognitive abilities, through appropriate guidance, enabling them to continue working for extended periods to maintain financial security.

Informal employment plays a crucial role in promoting labor force participation among older workers, as evidenced by a strong positive correlation between the informal sector and the labor force participation rate (LFPR) among individuals aged 65 and above. Thailand, with its substantial informal sector, has the potential to effectively tap into this resource to enhance the well-being and economic security of its ageing population. However, despite the large informal sector, old-age labor participation has declined in recent years, particularly when examining the LFPR change between the age groups of 55-64 and 65 and above. Thailand exhibits a significant negative shift, suggesting that a relatively high proportion of older workers have exited the workforce as they have aged. To address these challenges and harness the underutilized potential of the informal sector in Thailand's ageing society, a multifaceted approach is required.

The Active Ageing Index (AAI) encompasses four dimensions through its sub-indices: health, social participation, security, and enabling environments. By

incorporating these dimensions, the AAI and its sub-indices can assist policymakers in effectively evaluating the employment situation of older informal workers, identifying impediments to their participation in the workforce within the context of their specific local areas. Based on the AAI findings, concrete and tailored policies and programs can be formulated to support the employment and overall well-being of older informal workers. These initiatives could include: skill training and microcredit initiatives, social participation opportunities in regions where social engagement is a critical need and infrastructure development to facilitate mobility and communication.

By utilization of AAI as a policy tool to effectively create an active-ageing ecosystem suitably designed for the localities, policymakers can harness the potential of the informal sector to promote increasing labor force participation, financial security, social engagement, and continued contribution to society, ultimately leading to a more inclusive and sustainable ageing society in Thailand.

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Faculty of Economics, Thammasat University
2 Prachan Road, Bangkok 10200
Thailand

Tel +66 2 696 5979

Fax +66 2 696 5987

TRESP@econ.tu.ac.th